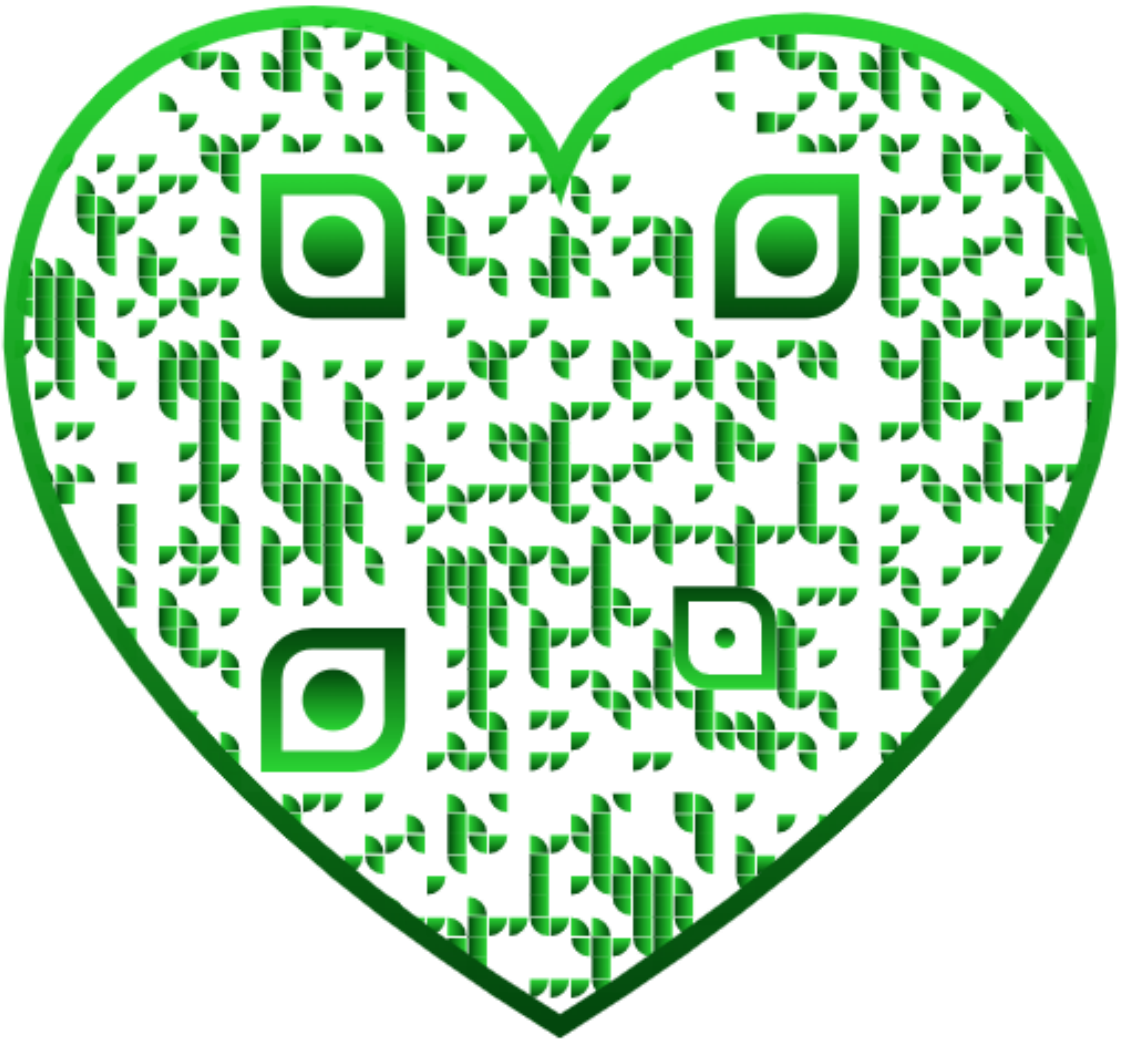
AURORA BOREALIS

The Ultimate Hunting Guide

WHAT IT IS, WHEN AND WHERE TO SEE IT,
HOW TO PHOTOGRAPH IT

LEONARDO PAPÈRA



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Conclution

First of all, thank you for downloading my ebook! I hope you will find it useful so that you can become a great aurora hunter during your next trip in the Arctic, and capture this incredible phenomenon with your own camera.

Let me introduce myself: I am **Leonardo Papèra**, a landscape photographer based in Tuscany. During the last few years I have made various travels up to the northern regions of Europe to witness and to learn everything I can about this mysterious phenomenon.

When I first tried to gather as much information as possible on the aurora borealis just before my first aurora-hunting trip, I realized that on the web there was a lot of information, but everything was very confusing, and at the end of the day I didn't learn so much. I was really struggling to find a simple, clear guide that could help me for my upcoming trip, but I was unable to find something useful.

So, this book is written for this purpose: to make a little clearing in your mind with all the information that you randomly found on the Internet (and maybe some tips and tricks that you will not read elsewhere!).

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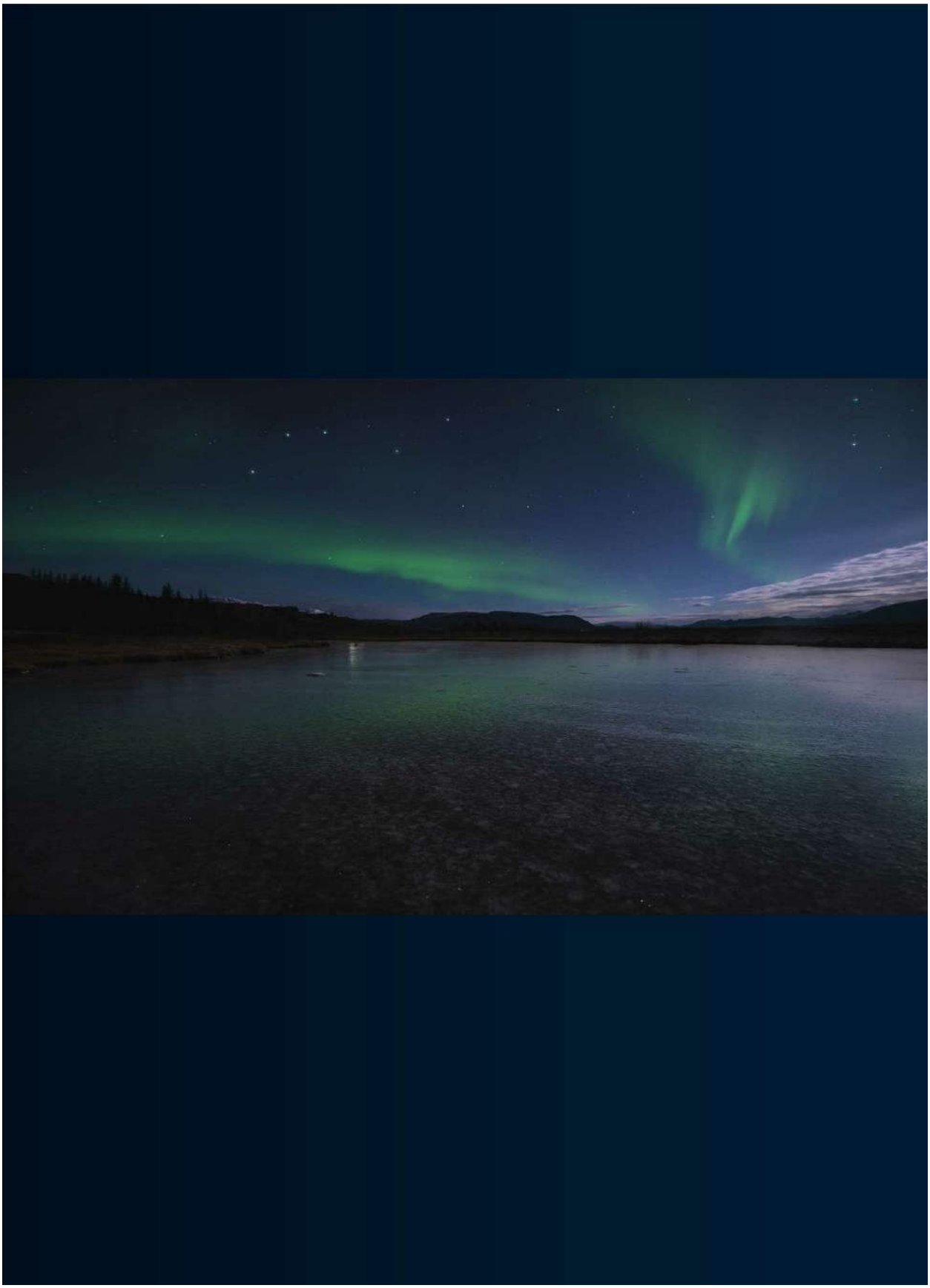
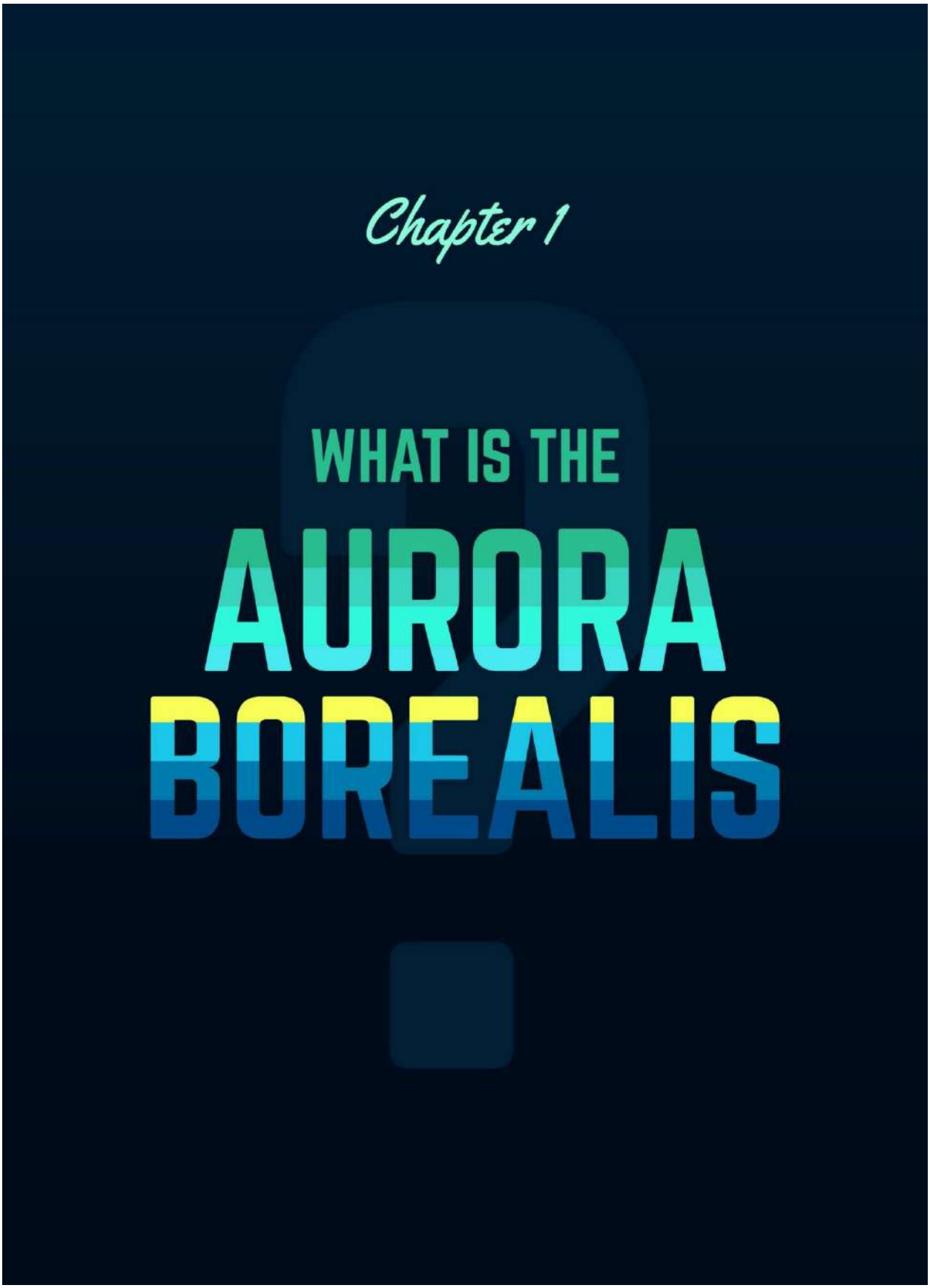
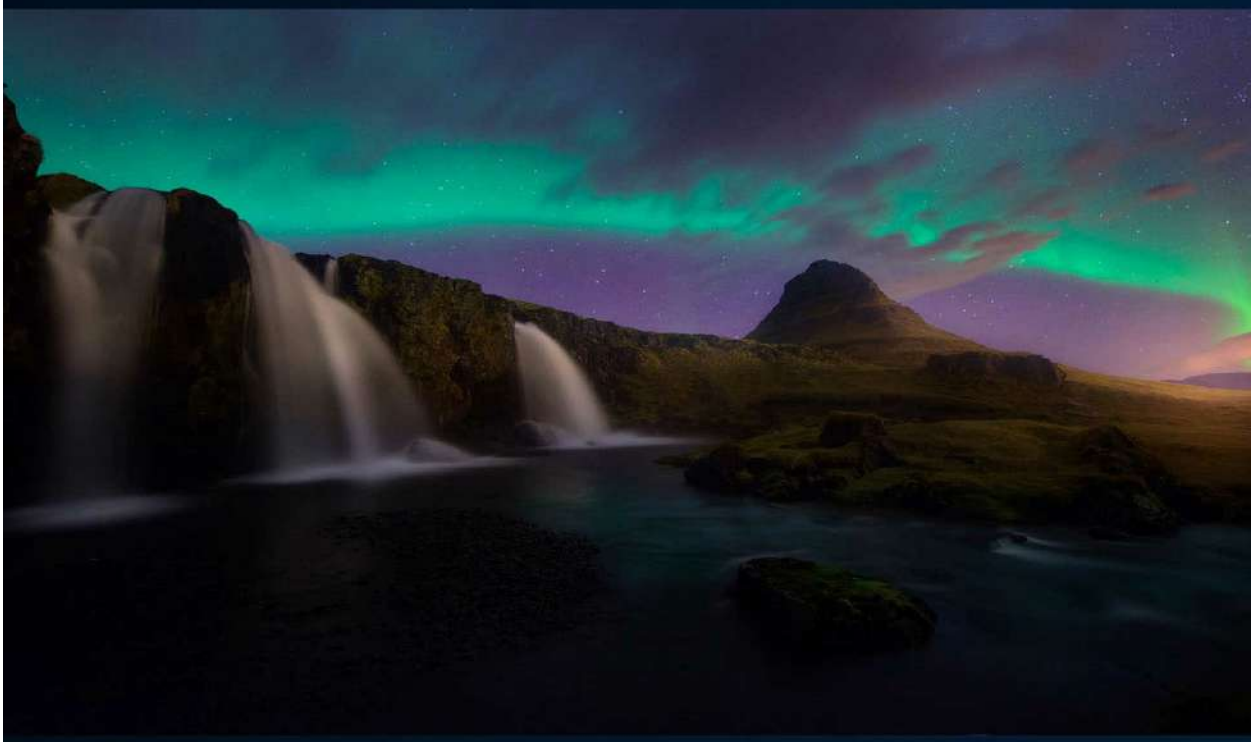



Chapter 1
WHAT IS THE
AURORA
BOREALIS

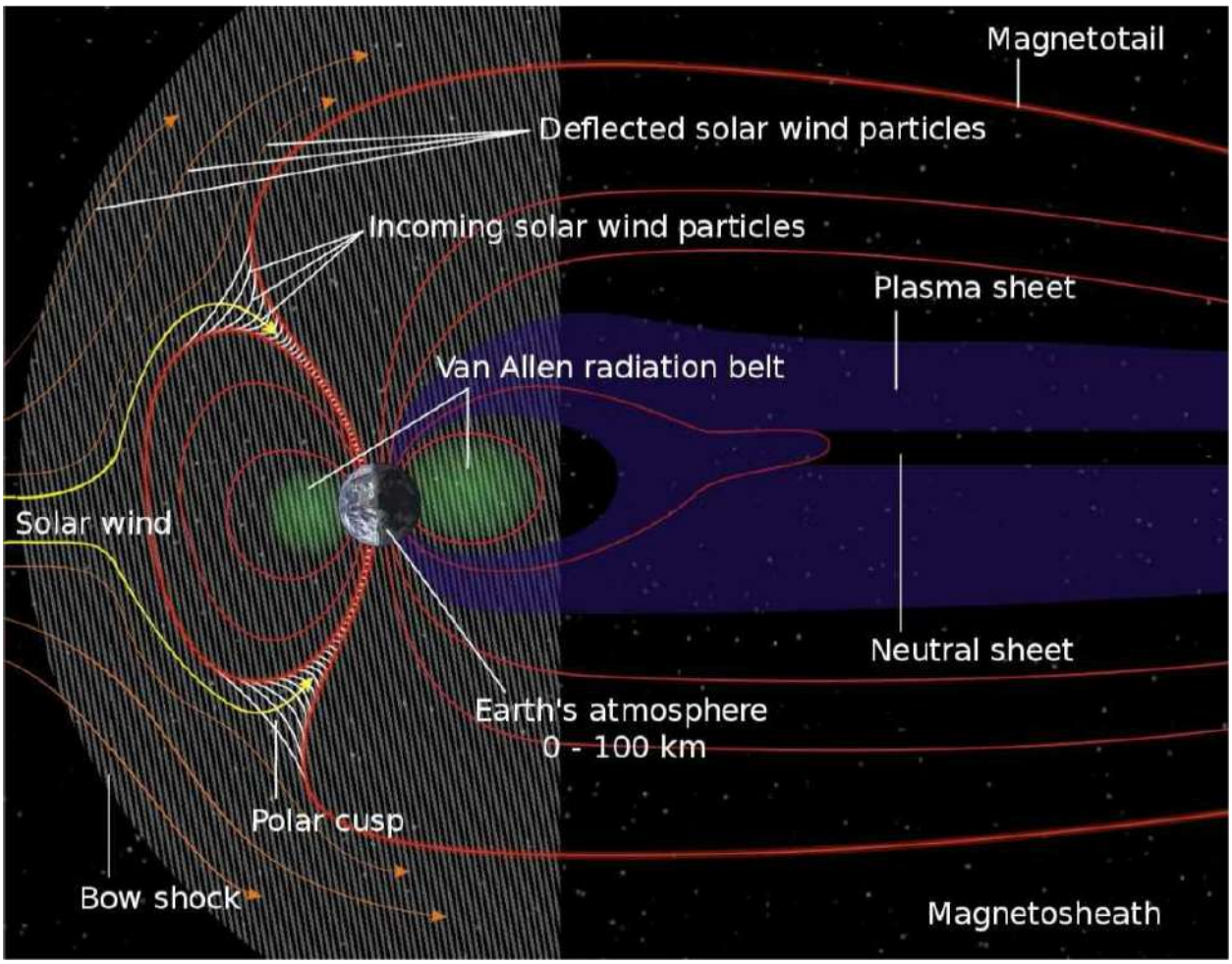


First things first. As soon as you realize you have the time and the money to make a trip to the north, don't skip the most important part of the planning phase: learning about what you are going to see, witness or photograph. This rule applies to all kinds of travels, not only the aurora ones – you should always be informed about the places you will visit.

In this particular case, before everything else, you need to know what the aurora borealis is and how on earth the night sky can turn in one moment completely green, violet, red or even blue.

I know that most of you (like me) are not scientists or physicists, so I will try to explain it in the simplest way possible.

The collision between electrically charged particles (electrons and positive ions) that come from the sun and the Earth's atmosphere is what causes the colourful light show you can observe during a cold night. These particles coming from the sun are also known as the "solar wind", a flow of hot plasma. When these particles hit the Earth's upper atmosphere (approximately 100 kilometres from Earth) there is an emission of photons caused by the fact that they are returning to the ground state (the lower status of activity of a particle) from an excited state (when a particle is in a higher state of activity).


Magnetotail
Deflected solar wind particles
Incoming solar wind particles
Plasma sheet
Van Allen radiation belt
Solar wind
Neutral sheet
Earth's atmosphere
0 - 100 km
Polar cusp
Bow shock
Magnetosheath

Photons are the result of energy loss by the particles of nitrogen and oxygen; these two elements will determine which colours you will be able to see that night! If the majority of photons are from oxygen emissions, the auroras that night will be green times and red just in some cases; alternatively, if the photons are created by nitrogen emissions, the auroras could be red or even blue (the rarest of all the aurora colours!).

Speaking of the aurora colours, I want to give you a quick list of all the colours in which you could see the northern lights:

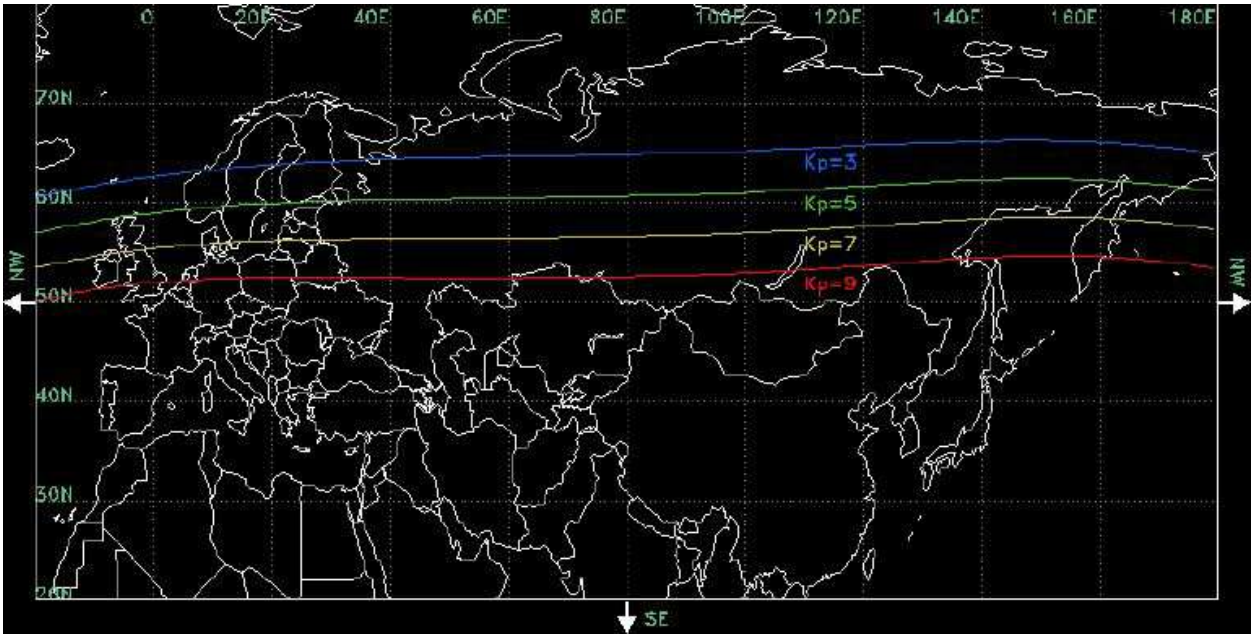
Green: The most common colour, and it's mainly because of two reasons. The first is because our eyes are more sensitive to green compared to other colours, so we can see it better than the others; the second is because the green auroras appear at lower altitudes than the others and their emissions dominate the other colours (red, generally).

Red: These auroras are created by collisions at higher altitudes than the green ones, and they are a little bit trickier to see. The human eye is less sensitive to the colour red and this makes it more difficult to see with the naked eye, combined with the fact that at those altitudes the concentration of atoms is pretty low. You will see these auroras only if the solar activity that night is pretty high; otherwise, you will just see the green ones!

Blue: This is the rarest colour of all the ones visible with the human eye. If you manage to see a blue aurora, you can consider yourself really lucky trust me. This kind of aurora is created at lower altitudes; most of the particles are nitrogen (oxygen is uncommon at these altitudes) and their emissions cause both red and blue colours, but the blue is dominant. In general, these auroras are only visible during the periods when the solar activity is at its best.

Other colours: Well, theoretically you could see many other colours, in particular different shades of red (pink, orange, yellow) or green, but that's because they are all combinations of the colours I have listed above.

Now is the moment to specify the meaning of "strong" or "low" solar activity, two terms that I used before. There is an internationally recognized unit of measure in the aurora world, known as the planetary index. Basically, it's a series of numbers, from kp 0 (which indicates that auroras will not be visible that night anywhere in the Northern Hemisphere) to kp 9 (which indicates very powerful solar activity for that night).



The image above is just a starting point to introduce you to what I'm saying. I will list all the kp levels here so that you will know roughly which zones are covered by the northern lights for each kp:

kp 0: Aurora is not visible anywhere in that hemisphere at that moment.

kp 1: Aurora is very weak; it's only visible in the middle of Greenland and in some of the most northern islands of Norway (not Lofoten, Tromso, etc.)

kp 2: Solar activity is still pretty weak, but some auroras should be visible in places like the Lofoten islands in Norway, around Inari Lake in Finnish Lapland, and in the northern parts of Iceland, Alaska and Canada.

kp 3: Aurora activity is starting to become a little bit stronger. You should be able to observe northern lights all around Iceland and in the middle part of Norway, Finland and Alaska, as well as in the northern part of Sweden.

kp 4: At this level, auroras become pretty strong in the northern regions I mentioned before (Lofoten, Iceland, Alaska, etc.), ensuring a really great show if you are there at the moment. A kp 4 aurora should also be visible in the Faroe Islands and in the middle parts of Canada.

kp 5 (G1): From here on, these auroras are so powerful they are classifi as "geomagnetic storms". These storms range from G1 to G5; a G1 matches a kp 5 aurora and so on. If you are lucky enough to be in the north when there is this level of solar activity and the sky is clear, it's pretty certain that you will see a show you will remember for the rest of your life – there is no doubt about that! At this level, auroras are visible in all the Scandinavian Peninsula (except the southern part of Sweden), Alaska, and they even start to appear in the north of Scotland.

kp 6 (G2): Solar activity is strong; shows are predicted to be seen in the whole northern part of Europe, Asia (Siberia) and North America.

kp 7 (G3): This level of solar activity is very rare; you could observe auroras even in London (light pollution excluded)!

kp 8 (G4): Auroras should be seen all around the middle of Europe (Germany, France, etc.), in the middle of the USA, as well as in every part of Canada and in the middle of Russia and other Asian regions.

kp 9 (G5): The highest aurora activity. Just to give you an idea, a G5 storm allowed some very lucky spectators to witness the aurora in the Italian Dolomites in 2003, so you can imagine what you would see if you were up

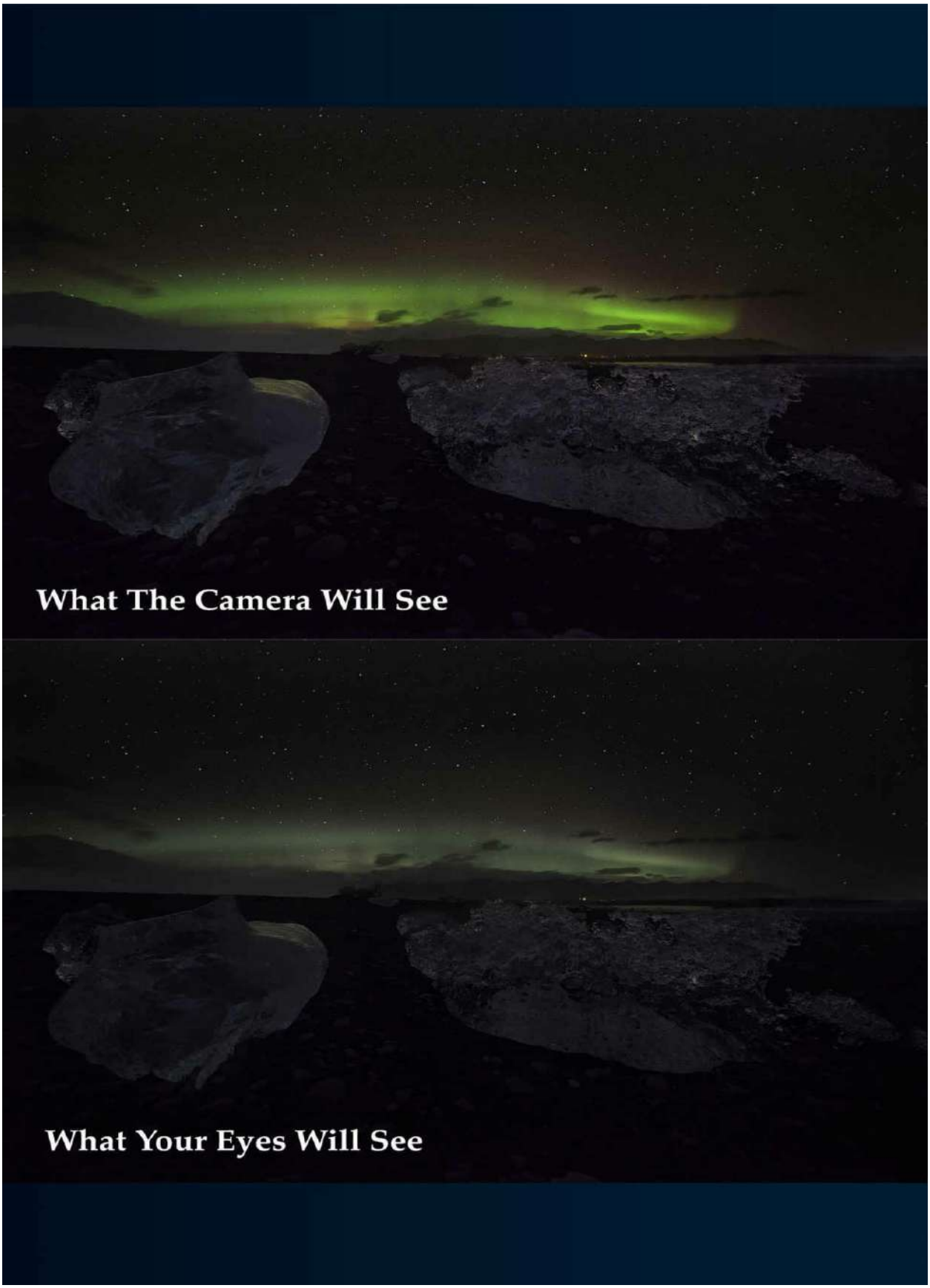
in the north.

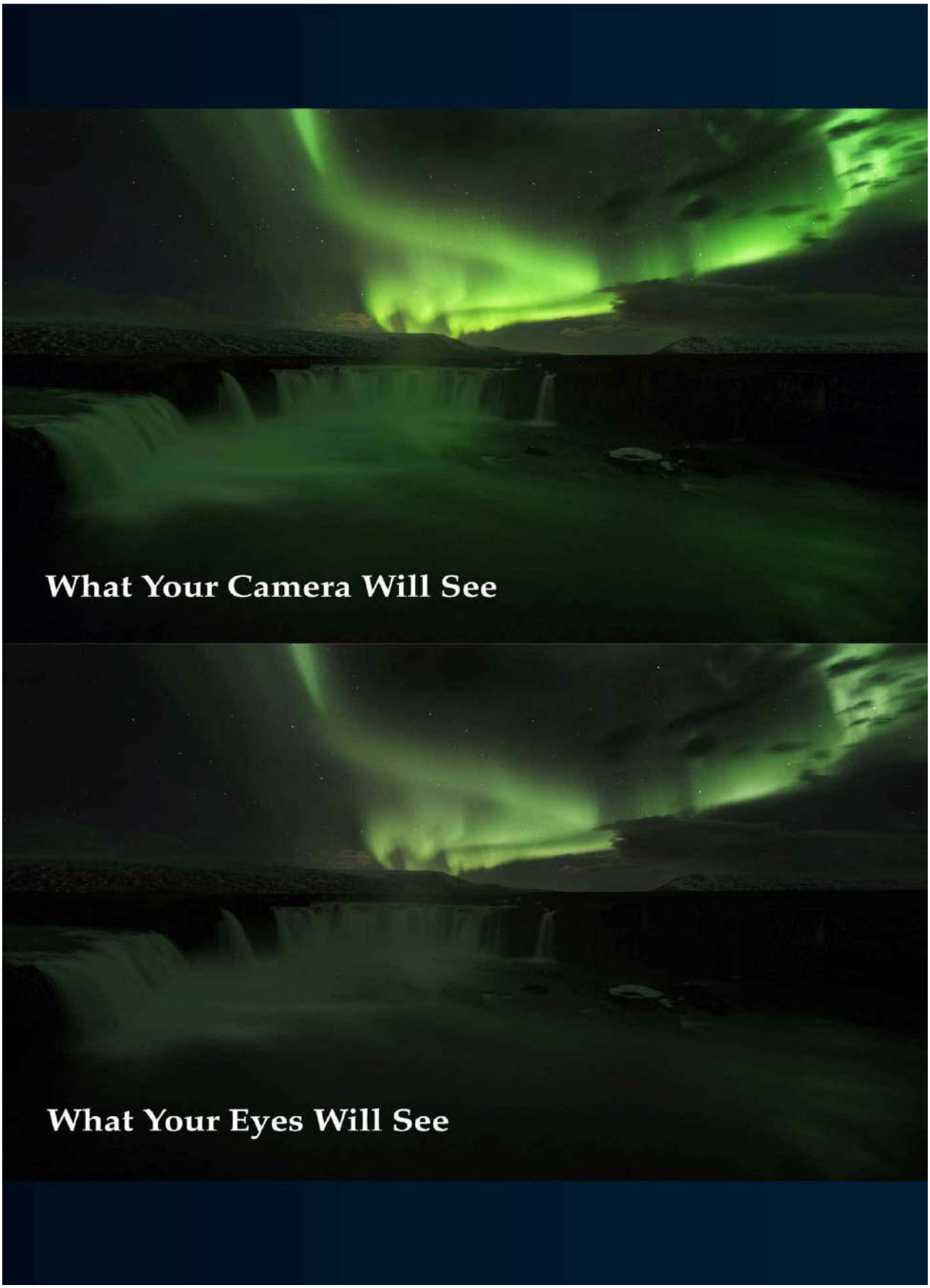
I highly suggest you check the website http://www.aurora-service.eu during you trip (I am not sponsored or affiliated; I just think it is a really well-made website) to keep track of solar activity and hourly updated aurora forecasts (pretty unpredictable, but these are the best!).

Well, at this point you should already know what the aurora borealis is, which colours you can observe during your northern lights hunt, and how the whole planetary index and the kp scale works.

But now it's time to face the sad truth for you. If, during the first nights of your trip, you do not encounter strong solar activity, you could be disappointed by what you will see, especially after all those beautiful photos you checked out on your computer. The camera sensor manages to capture a lot more light than our eyes, so some photos can fool you. I will try to show you some examples of photos I have made in recent years, in their edited final version and the "real" version (what you will actually see!).

What The Camera Will See
What Your Eyes Will See


What The Camera Will See
What Your Eyes Will See


What Your Camera Will See
What Your Eyes Will See

Of course, these are just approximate examples. If the aurora is subtle and not powerful, you will see a faint cloud that is not moving at all. But if the aurora is strong and powerful, you will enjoy an incredible light show and you will see the northern lights dancing in the sky for real. It is just a matter of luck!

Chapter 2

WHEN & WHERE TO SEE THE AURORA BOREALIS

Now that you know the minimum required
about what the aurora borealis is, we can start to talk about
when and where to watch it.

WHY?

Well, because northern lights can be a little bit tricky to see;
they are beautiful, and like all wonderful things,
you cannot take them for granted!

2.1 WHEN YOU CAN SEE THE AURORA BOREALIS

There’s generally one answer to the question of when: in winter. Actually, it’s a little bit more complicated than that. Theoretically you could see the northern lights all the year round, even in July; the only requirement you need is darkness. Darkness during the summer up in the far north is a little bit difficult to find because in that period, the sun is always above the horizon and there is no night from late May to late August.

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So, if you want to visit the northern regions of the planet, summer is a great period (and the warmest!), but not for the northern lights hunt. You will need to pack a few more clothes, because you can see the northern lights from September to April – in other words, during the coldest seasons.

Of course, the more darkness you have, the more chances you'll get to witness the aurora borealis; for example, around December 21 (winter solstice, the shortest day of the year) in the northern regions there are very few hours of light (generally three or four hours, but it varies from region to region, of course) so the odds of catching a great light show are on your side. During autumn or spring, you will still be able to see the northern lights, but the days are longer (up to twelve hours of light) so if you are determined to see the aurora dancing in the sky you might be forced to stay up all night!

Now that I've made it clear that winter is the best period to see the northern lights, I should clarify that there are also some downsides that may change your mind.

First of all, there's the temperature. In winter, depending on where you are going, you could encounter temperatures down to -40 Celsius. At these temperatures, your aurora hunt will be incredibly difficult and the costs will be higher because of the technical equipment you'll need. In autumn or spring, the chances of encountering these temperatures are much lower, so you can dress a little bit lighter and possibly stay out there watching the sky a lot longer.

Another downside of winter is the snow. Don't misunderstand me, please – I love snow. I love to go out there in the wilderness when everything is white. But when it comes to driving hundreds of kilometers on snowy and icy roads, it's a different matter. The risk of losing control of the car and going off the road is higher, the visibility goes down a lot, and you don't get to properly enjoy the beauty of the road trip because you're too focused on driving.

In summary, if you are brave and stubborn enough, and ready to challenge the weather, the temperatures and the slippery roads, you can visit the north during the winter. But if you just want to enjoy your holiday and after dinner go out again to watch the night sky in warmer temperatures, you definitely should plan your holiday in autumn or spring.

2.2 WHERE YOU CAN SEE THE AURORA BOREALIS

The other big question we will answer in this chapter is the question of where. I have already alluded to this several times throughout the book, but now it's time to discuss it in more detail.

If you carefully read the previous pages, I have mentioned multiple times the "north": it should be pretty obvious now that the so-called northern lights appear in the northern regions of our planet.

Before exploring in detail the best locations to witness this phenomenon, I would like to answer another question: Why can't we observe the northern lights around the Equator, in Africa, etc.?

This is not possible (although some auroras, during some peaks of solar activity in the past, have been spotted in areas close to the Equator such as Hawaii or in Japan) because of the way the charged particles interact with the Earth's magnetic field: When these particles coming from the sun arrive in the Earth's proximity, they get trapped in the spiral paths of geomagnetic field lines. These magnetic field lines converge at the poles so that they are denser and also closer to the Earth's surface; therefore, this allows us to see the northern lights exploding in the sky only in the proximity of the polar caps. Of course, the "full" procedure is way more complex than that, but I tried to explain it in the simplest words I could find.

This is a really simple image just to help you understand the process:

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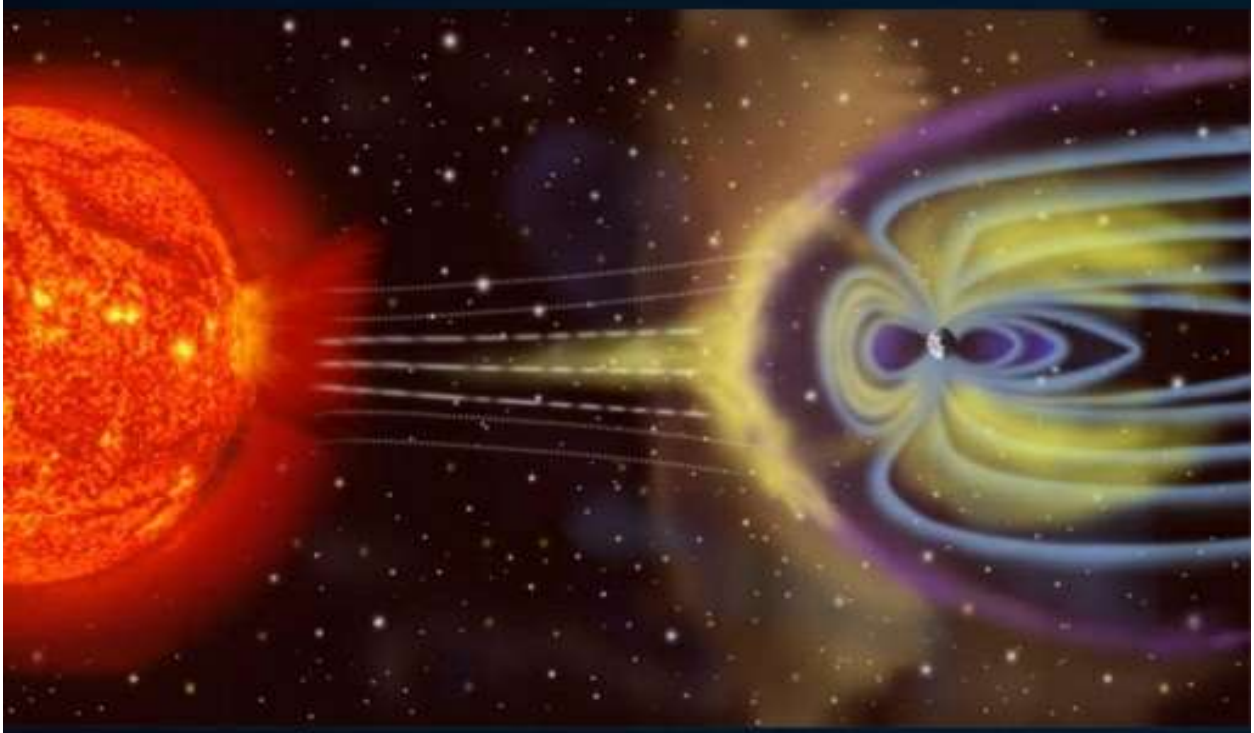


Now that we understand why we can observe the aurora borealis only when we are close to the Arctic circle, let's see precisely which are the best locations to enjoy it.

Let's start with North America. On this continent, the regions that are crossed by the Arctic Circle are Canada and Alaska.

In Canada, the best locations are around the Yellowknife area (Northwest Territories) and the Yukon area, but the northern part of Quebec is also great. Of course, if the solar activity is strong, you can see auroras in British Columbia, Alberta and so on.

Alaska is even better than Canada for the northern lights hunt: in the southern part you are still very close to the Arctic Circle and the chance of seeing auroras is always great.

Both in Alaska and in Canada, if you decide to go in the outback where you will find all those spectacular forests, you will have to deal with the cold temperatures and the other problems I mentioned before.

I have to say that, during strong solar activity periods, several glows above the horizon are registered also in the northern states of the U.S.A., but I wouldn't recommend making a northern lights hunting trip there because the chances of seeing a great light show are close to zero.

From North America, let's skip to the Asian continent – or, to get directly to the point, to Siberia.

The last continent where you can witness the northern lights is Europe. Here, the aurora-tourism industry is maybe the most developed in the world, with a lot of facilities and all kind of structures throughout all the regions where you can see northern lights.

In Europe, the variety of landscapes where you can make your winter trip is incredible. From the rough seascapes of the northern coast of Norway to the magical forests of Finnish and Swedish Lapland, and from the lunar landscapes of Iceland to the iceberg world of Greenland, there are plenty of locations where you can observe the green lady dancing.

Let’s explore some of these locations a little more deeply, starting from the northern part of Norway, which is maybe one of the most famous locations for aurora sightseeing.

Along the coast there are a lot of well-known spots where, during winter, an incredible number of tourists visit to get the chance to witness the northern lights. Some of these spots are the Lofoten Islands, the island of Senja and the

Tromsø area. In particular, the city of Tromsø is considered by most to be the capital of the northern lights, also because it is one of the most populated cities at that latitude and offers many kinds of aurora tours and similar services.

This destination is chosen by many tourists also because of the temperature. Thanks to its proximity to the sea and therefore to the influence of the Gulf Stream, even in the coldest months of winter the temperatures in these locations never becomes too cold, settling around zero degrees Celsius. This

is crucial when you have to stay out all night. The downside is the much less predictable weather; it is a short step to move from a clear sky to a snowstorm. These are exactly the same weather conditions you will find if you choose Iceland as your winter trip destination.

Greenland Sea
Arctic Circle
Ísafjörður
West Fjords
Vatneyri
Holmavik
Blönduós
Húsavík
Akureyri
North
Mývatn
Seyðisfjörður
Hellisandur
West
Snæfellsjökull National Park
Borgarnes
Interior
East
Þingvellir National Park
Geysir
Gullfoss
Reykjavík
South west
Keflavik
Hafnarfjörður
Blue Lagoon
Landmannalaugar
Vatnajökull National Park
Jökulsárlón
Hofn
South
Vik
50 km
50 miles
North Atlantic Ocean
Iceland

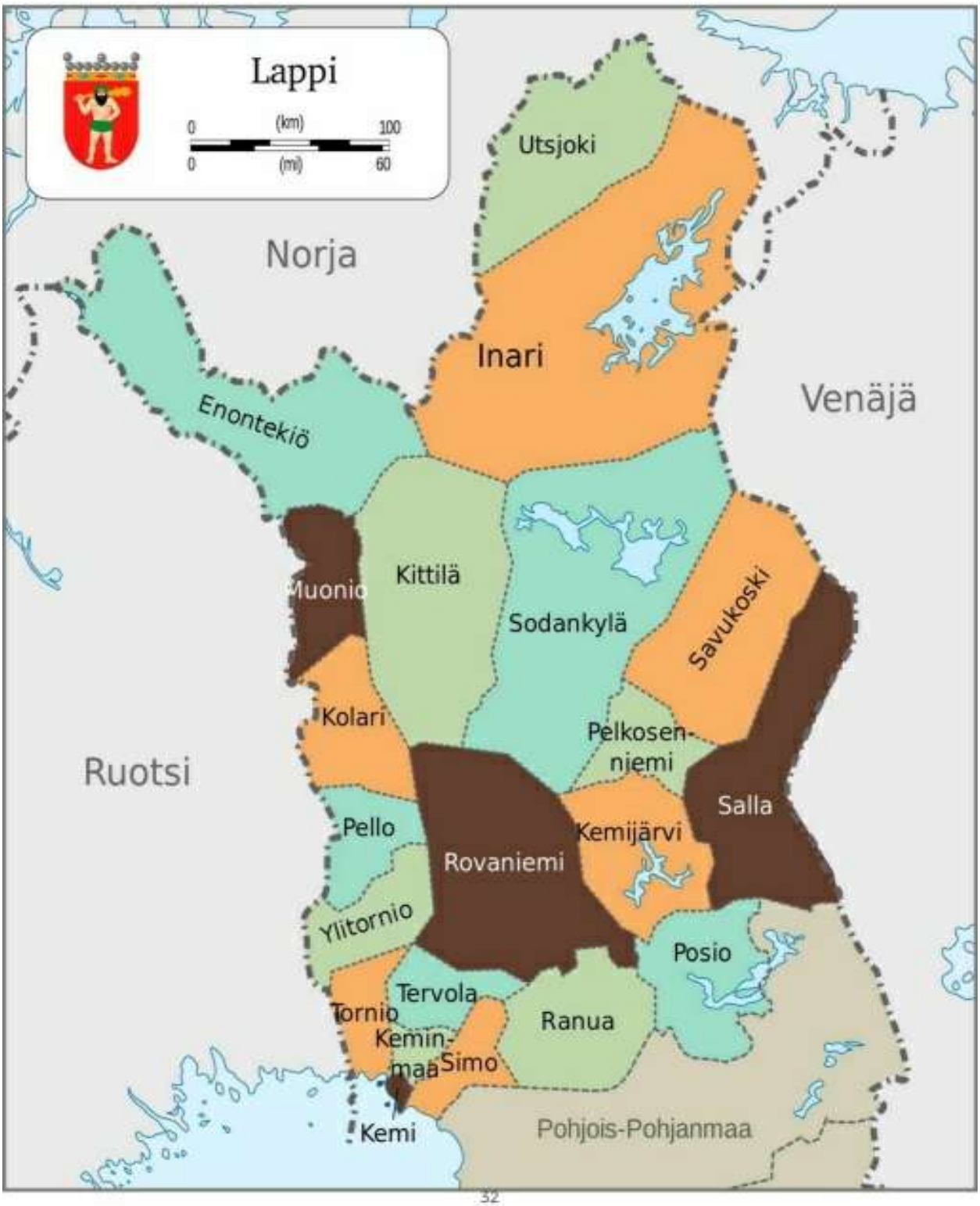
Let’s jump from the Norway coasts to the island of Iceland. Remaining on the weather argument, this is maybe the nation with the most unpredictable weather in the world. There is a local proverb which reads, “If you don’t like the weather now, just wait for five minutes: it will probably get worse”, and trust me, this is the truth – especially in winter, when you can find gale winds all around the coast and heavy snowstorms.

During the cold seasons, the roads that take you to the inner parts of the island are closed due to the snow and so you will have to remain on the main roads, all around the coast. When it comes to chances to catch the aurora in this nation, they rapidly change going from north to south; if you check the kp scale I told you about in the first chapter of this book, you will see that the northern part of the island is the kp 2 zone, while the south is around the kp 3; this is the equivalent of saying that if you stay in the northern part of Iceland you will have much more of a chance of seeing the northern lights than in the southern part.

The city in the north where you will probably find accommodations if you decide to make your trip there is Akureyri, the biggest town in this region of Iceland; near this city are some famous landmarks such as the Godafoss (waterfall of the gods), Dettifoss and the Myvatn lake area.

If you want to visit the southern part of the island, even if it’s worse for aurora sightseeing, I suggest you search for accommodations around the city of Vik (the southern town of Iceland), the city of Hofn (in the extreme southeast) or in the Snaefellsnes peninsula; from these places, you can reach all the locations that have made Iceland famous all around the world.

Now is the moment to jump from the “warm” temperatures around zero degrees Celsius of Iceland and Norway, to the -40 Celsius of the Finnish Lapland, one of the coldest regions of the planet.


Lappi
0
(km)
100
0
(mi)
60
Utsjoki
Norja
Inari
Venäjä
Enontekiö
Muonio
Kittilä
Sodankylä
Savukoski
Kolari
Pelkosen-
niemi
Ruotsi
Salla
Pello
Kemijärvi
Rovaniemi
Ylitornio
Posio
Tervola
Tornio
Ranua
Kemin-
maa
Simo
Kemi
Pohjois-Pohjanmaa

The upper regions of Inari, Utsjoki and Enontekiö are the ones that guarantee the best chances of catching some incredible light shows, but in Muonio, Kittilä, Sodankylä and Savukoski the possibilities are still great.

Last but not least, let’s talk about Greenland and its iceberg world. For sure this is the hardest place to reach and to move around during winter, and this is why most tourists visit Greenland during the warmest seasons.

ARCTIC OCEAN
Ellesmere Island
CANADA
Greenland Sea
Qaanaaq (Thule)
Baffin Bay
GISP2
3,205 m
Ilulissat (Jakobshavn)
Aasiaat (Egedesminde)
Sisimiut (Holsteinsborg)
Maniitsoq (Sukkertoppen)
Nuuk (Godthåb)
Denmark Strait
Arctic Circle
ICELAND
Labrador Sea
Qaqortoq (Julianehåb)
ATLANTIC OCEAN
Thickness of Greenland ice sheet
Thickness over 10 m above bedrock and mean sea level
3,205 m
3,000 m
2,500 m
2,000 m
1,500 m
1,000 m
10 m
capital
major settlement
Qaanaaq (Thule) name (Danish name)
3,205 m location of maximal thickness
GISP2 location of GISP2 drill
Lambert conformal conic projection - WGS84 datum
standard parallels: 65° N - 70° N
central meridian: 42° W
scale: 1:8,000,000 (precision: 2 km)
0
(km)
400
0
(mi)
300

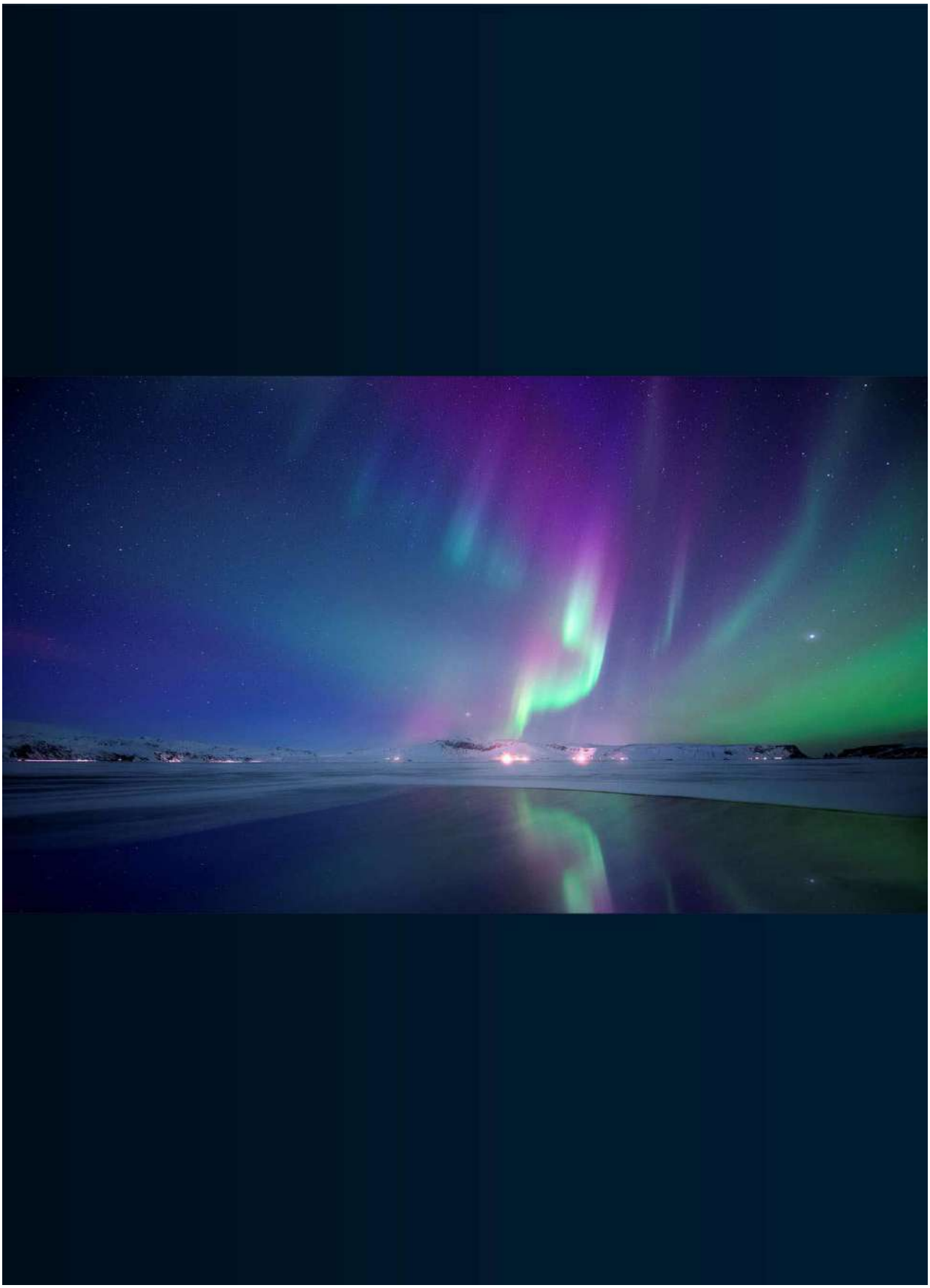
If you decide to combine the will to visit this region with the desire to see the northern lights, the best months to go there are the end of September, October, and the first part of November. Most of the tours and other services stop their activity during winter and to explore even a little bit outside the main cities becomes a great challenge, and if you are not adequately prepared you really risk getting lost somewhere in the snow or freezing to death. Always be sure of what you are doing, and never overestimate your capabilities.

We have arrived at the end of this chapter; now you should know when and where to organize your trip! Of course, once you have chosen a destination and the time of the year you will travel, it's necessary to do some deeper research to better know all the best spots, the peculiarities of that place, and so on.

The more information you get,
the more chance you have of enjoying your trip!

Chapter 3

HOW TO PHOTOGRAPH THE AURORA BOREALIS



3.1 WHAT KIND OF EQUIPMENT DO I NEED TO CAPTURE THE AURORA BOREALIS?

3.1.1 THE CAMERA

In the last few years technology has improved significantly, especially in the photography world; in the early 2000s, only a limited number of camera models could capture the beauty of the northern lights, and they were really expensive.

Nowadays, even with some smartphones you can photograph the night sky; this has boosted the quantity and quality of photos of this particular phenomenon, and in turn increased tourism in the northern regions of the world.

Of course, the photos that you will get with a smartphone won't be the same as what you'll achieve with a reflex or mirrorless camera. There are still some limits (like the digital noise or the dynamic range) to most of the low-end digital cameras that will send you home with shots you won't be fully satisfied with.

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Let me explain it better with a visual example:

This is a shot I made during my first aurora travel in the Finnish Lapland, and it's made with a Nikon D5100: a reflex camera, non-full-frame (APS-C) and so with a smaller sensor and with a price tag at that time of about six hundred euro. (Now on the same price level is the Nikon D5600, if I am not wrong.) I managed to capture the aurora, as you can see, but the high noise produced by the camera made the foreground look blurry; the colours are dull and most of the details are gone. This is because all of the APS-C cameras (which are normal reflex cameras with a smaller sensor) are more sensitive to the ISO increase and the loss of quality is higher than with a full- frame camera. Nowadays there are APS-C cameras (like the Nikon D500 or the Canon 7D II) which have made big improvements when working in low-light conditions, but still most of the full-frame cameras are better.

Now, take a look at this:

This shot is taken with a Nikon D800, a full-frame camera; I think the difference is pretty clear. The shot is less noisy, the colours are more vivid and you can see all the details.

I think you understand what I am saying: There are different levels of expectations about “photographing the aurora”, and you have to decide what you expect. If you’re ready to settle for a green glow with all the rest of the landscape completely black, you can even use your high-end smartphone and it will be a nice memory of your winter holiday; but if you decide you want to capture some incredible nightscapes and maybe print them after your trip, you will need something more than a smartphone.

To make it easier for you, I’ve compiled a list of the best cameras on the market (or recently put out of production) at the moment for night photography:

- **Sony A7S II/A7R II**
- **Nikon D5**

- **Canon 1DX/1DX Mark II**
- **Nikon D4/D4S**
- **Nikon D750**
- **Canon 5D Mark III/5D Mark VI**
- **Nikon D810**
- **Canon 6D**
- **Canon 5DS/5DSR**
- **Sony A7S/R**
- **Nikon D800/D800E**
- **Nikon D600/D610**

Of course, as I already have said, these are the best reflex/mirrorless camera models on the market in my opinion; the minimum budget you will need to buy one of these cameras is around a thousand euro at the least, so they are also pretty expensive if you are not a photographer.

If you are not interested in spending all that money on a camera body, you can always take a look at the APS-C models; the results you will obtain, with an accurate technique, will be more than decent. Here is a brief list of the best APS-C camera models in my opinion:

- **Nikon D500**
- **Canon 7D Mark II**
- **Sony A6500**
- **Nikon D7200**
- **Sony A6300**
- **Canon 80D**
- **Nikon D7100**

3.1.2 THE LENSES

Now that you have chosen the right camera for you, it's time to make an even more important choice: which kind of lens will you need during your trip?

First of all, let's narrow the fi a little bit: We need a bright grandangular lens. When I say grandangular, I mean a lens that goes from 10/11mm to 30mm; in this focal range you will fi the perfect lens to photograph the night sky.

Why can't we use a normal or tele lens? Because with those focal lengths you could only photograph a part of the sky or the aurora, while we want to catch all the movement and a part of the sky as large as possible.

The other adjective I have used is "bright". When I say bright, I mean a lens with a maximum aperture of f/2.8 (or f/2, f/1.8 and so on, the wider the better!); a lens with a wide aperture like this can catch more light through the glass and so give a brighter (and less noisy) shot, compared to other lenses with smaller apertures. It's a critical aspect when you constantly have to shoot in low-light situations like during the night.

Just as I did for the cameras, I will provide a rough list of the best lenses you can buy. This time I'll split the list into two parts – one for the lenses designed specifically for APS-C cameras and one for the full-frame lenses:

APS-C:

- **Tokina AT-X 11-20mm f/2.8**
- **Tokina AT-X 11-16mm f/2.8 Pro II**
- **Samyang/Rokinon 10mm f/2.8 ED AS NCS CS**
- **Samyang/Rokinon 16mm f/2.0 ED**
- **Sigma 18-35mm f/1.8 DC HSM Art**
- **Nikon AF-S 10.5mm f/2.8 G ED Fisheye**
- **Samyang/Rokinon 8mm f/2.8 UMC Fisheye II**
- **Sigma 4.5mm f/2.8 EX DC HSM Circular Fisheye**

Full-frame:

- **Nikon AF-S 14-24mm f/2.8 G ED**
- **Nikon AF 14mm f/2.8 D ED**
- **Canon EF 16-35mm f/2.8 L I/II/III**
- **Canon EF 14mm f/2.8 L USM II**
- **Nikon AF-S 20mm f/1.8 G ED**
- **Sigma 20mm f/1.4 DG HSM Art**
- **Samyang/Rokinon 14mm f/2.8 IF ED UMC Aspherical**
- **Nikon AF 16mm f/2.8 D Fisheye**
- **Canon EF 24mm f/1.4 L II USM**
- **Nikon AF-S 24mm f/1.4 G ED**
- **Nikon AF-S 24mm f/1.8 G ED**
- **Venus Laowa 12mm f/2.8**
- **Zeiss Milvus 15mm f/2.8**
- **Zeiss Milvus 18mm f/2.8**
- **Zeiss Milvus 21mm f/2.8**

The list is not in any order, because everyone must decide based on their own personal needs. Some of you will search for less expensive lenses, not being interested in quality; others will look for the best quality lens, not

considering the price tag. It’s a personal thing.

I added some fisheye lenses to the list, even if I don’t recommend them. The distortion effect they give to the shot is unusual and surreal, which you may or may not like, but after you use it for a little while you will get tired of it. Of course, that’s my personal thought. Some photographers always one in their bags; it’s just a matter of tastes.

3.1.3 OTHER PHOTOGRAPHIC ACCESSORIES

I think you already know that the “gear” does not refer only to the camera and the lenses. There is a whole world of accessories, some of which are fundamental, others that are useful, and some that are completely useless for the photographic genre we intend to practice.

TRIPOD

I want to start with the most important accessory you will need: the tripod. Don’t even think of planning a trip to hunt auroras if you don’t have in your hands a good, stable tripod for your camera.

Taking pictures during the night means that the exposure times of your shots will vary from two to three seconds to even some minutes; so, unless you can hold the camera perfectly steady for that range of time, you will need something to put it on.

I personally know a lot of photographers that save a lot of money by buying a cheap tripod, preferring to spend it on some other equipment. Don’t do this, seriously. Tripod are expensive, but they can save your camera (and your shots!) so many times if you are wise enough to buy a good one; just think about the wind, the sea, and all the other conditions you can encounter when you are out there shooting. Remember that you are not preparing yourself to take photos in a studio, where the only thing that can make your camera fall from the tripod is if you stumble into it.

Too many times I’ve seen photographers with something like five thousand euro of camera and lens on a fifty-euro tripod. Are you willing to take the risk?

There are too many different models and brands to write down a list here, so I am going to make some distinctions to help you choose the right tripod during your research.

To start, tripods can be made with two different materials: aluminium or

carbon fibre (in some cases mixed with magnesium). Generally speaking, the aluminium ones are cheaper but they are also heavier. The choice will depend on the level of your physical ability and the quantity of time you will spend hiking during your trip; the difference in the same model of tripod between aluminium and carbon fibre can be up to two kilograms, so think about it very carefully. It's for sure the heaviest thing you will have to bring on your back during the whole trip.

The other distinction we have to make is the number of sections that your tripod will have. Generally they have from two to five sections.

My opinion in this case is "less is better"; I would stick to a three-section tripod maximum, not more. I am telling you this because of logical reason: The bearing points between one section and another are the spots where sand, water and salt could enter inside the leg of the tripod and they could do some serious damage to it. So, the consequence is obvious: fewer access points, less chances to break your tripod.

The third and last distinction I'll make is about the tripod's maximum height from the ground. Some photographers give top priority to this aspect, and others care nothing. It's a personal decision, but let me tell you two things from my experience:

1. A 180cm tripod is not going to help you make a more beautiful photo than a 150cm one, so don't make your choice based on a few centimeters of difference.
2. Ninety percent of my night shots are made from an average height of 70 centimetres; of course, some are made from ground level and some from a meter or more, but that's the average. I have encountered very few situations where I needed to completely open up the tripod and then thought, "Wow, fortunately I bought a 180 centimetre tripod". Keep that in mind.

Now you should be ready to choose the tripod you will need!

TRIPOD HEAD

In my early photography days, when I was just considering exploring the

world of landscapes, I ordered my tripod and I naively thought that I would be okay with that. When it arrived home, I tried really hard to fit my camera on it but the screw didn't enter in the camera hole. I decided to go on the Internet and read a little bit to find the solution. It turned out that I still needed one other piece to mount my camera on the tripod: its head. So I put myself to work to find the best head for my needs. I discovered that there are so many different kinds of photographic heads, and it was a really thought- out decision to buy the one that I still have today. In the end I am glad I made the right choice.

The main difference between tripod heads is how they let you move your camera. Mainly, there are four types of heads:

THREE/TWO-WAY HEADS

I've grouped together these two kinds of heads (the three- and two-way) because the structure and the way they work is completely the same; the only thing that changes is, of course, the number of movements you can make.

These kinds of heads ensure high precision of movements and in general, they are great for genres such as macro photography, where you need short and precise movements to focus the subject perfectly.

I've even seen some landscape photographers that use these kinds of heads; their motivation, most of the time, is that they started with that type and now they stick to it because they got used to it.

Don't misunderstand me – they are not terrible; they simply are not the best for our situation.

GIMBAL HEAD:

This kind of head is very specific and expensive; it is designed mainly for photographing wildlife and I wouldn't recommend it for our nightscape shots.

PANORAMIC HEAD

Like the gimbal head, this type is very specific and it's designed to make panoramic shots. They could fit pretty well for our genre of shots, but their peculiar form makes them quite intricate to use for everyday photography, especially if you are not always making panoramas (intended as a photo composed of more than one shot, not as a single landscape photograph).

BALL HEADS

Finally, this is the type of head I recommend that to buy; these are, without a doubt, the most practical and easy-to-use heads on the market for our purposes. You can move your camera really quickly in all directions and the lock/unlock mechanism is fluent with this kind of head. Out in the field these features are fundamental: when you are freezing in cold temperatures, you will not have difficulties in actioning your head while searching for the right composition.

In the end, the decision is up to you, of course: My suggestion is to buy a ball head if you are only interested in shooting nightscapes or landscapes in general. If instead you are passionate about macro photography, for example, and you practice it for the rest of the year, of course the right camera head for you is the three-way one.

REMOTE CONTROL SHUTTER

The next inevitable accessory is the remote control shutter. The most important thing that this gadget allows you to do is to avoid blurred shots due to the vibrations of your finger when you press the shutter button on the camera. A lot of times the vibrations are minimal and you will not notice them until you open the photos on your computer; it's a common mistake and one of the most painful, since when you see it, it will be too late and there is absolutely no way to recover a blurry shot.

There are three ways to remotely control your shutter:

- Wi-Fi Connection: Some of the newest camera models have this really useful feature, which allows you to control not only the shutter button, but also all the other parameters from your smartphone with a specific application.
- Infrared Control Shutter: If your camera doesn't have built-in Wi-Fi, you are still able to activate your shutter without a cable with the infrared connection. The only issue with this kind of remote control is that they are great when you need to make a thirty-second shot, but when you have to go further and make an exposure of a few minutes (a pretty common thing in our genre) they have some problems reading the Bulb mode (I will explain what this is later).
- Lastly, there is the classic cable remote control shutter. These kinds of controls have some pros and cons, but in the end for me they are the best. First of all, this is for sure the most reliable and resistant one; many of them don't even need a battery, so they can really last forever and you don't have to worry about always dragging another battery around with you. They also allow you to use the Bulb mode of your camera and so to use the exposure time that you need at the moment, no matter how many seconds or minutes.

On the other hand, they are for sure the bulkiest ones and you can't ever get away from the camera too much with them in your hands. For practicality, the Wi-Fi ones are maybe the best, but in our case I highly suggest you buy one of these cable shutter controls to be sure you do not have problems with reliability.

BATTERY GRIP AND/OR BACKUP BATTERY

One of the many problems about shooting in cold temperatures is the reduced life of the battery. You must be prepared to change your battery many times during your trip and have with you at least two backup batteries always fully charged. A battery grip can help you a lot by extending the time you will be able to shoot without worrying about the camera battery life, but I still recommend having in your backpack some batteries so that you never run out of power.

TORCH

It may sound pretty obvious, but when you are planning to move, hike or shoot during the night, you will need a good torch to illuminate the path or the things that surround you and maybe sometimes to lightpaint the foreground of your shots.

I suggest you buy a model that features a red light mode, so that your eye will adapt more quickly to the darkness and you will be able to observe the night sky just after a few minutes; in fact, red impacts our night vision less than the other colours.

My other advice is to buy a headlight so that you will have your hands free and can operate your camera without worrying about the light.

3.1.4 HOW TO DRESS/DEAL WITH COLD

The key word here is layers. If you want to stay out for hours in sub-zero temperatures, you will need to dress in layers; by applying this rule, you will be able to decide right in the moment if you need to undress a little bit (maybe because you walked a lot) or if you have to cover yourself even more because you are freezing.

Night photography sometimes is all about walking and moving around; other times, it is all about standing still to wait for the right moment. In the second situation, most of the time you'll get cold after standing around for a bit (or even worse, if you sit down) and it will seem like you are freezing to death. In these cases, my suggestion is to get up and do some movements, maybe walk around a little until you start to feel a bit warm again; there is not really a fast-working solution (other than returning to the car and turning on the heat) so you will have to resist the temperatures by dressing heavily.

I've told you many times that it will not be easy to stay out there and you will often be tempted to return to your warm hotel room, but before doing that just think about what you will miss. You will regret it – trust me.

3.2 WHAT SETTINGS DO I NEED TO USE TO CAPTURE THE AURORA BOREALIS?

In this paragraph I will teach you (finally!) how to properly use all the photographic equipment we talked about in the previous section, starting from the camera settings, to how to focus in the darkness and many other useful tips and tricks. In the field, you will need to know how to deal with all the settings very quickly to adapt yourself to the evolving situation, especially when the aurora level is changing rapidly, so that you can capture the show in the best possible way. For better control of your camera, I highly suggest putting it in Manual Mode, so that you can change all the parameters as you like.

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3.2.1 THE EXPOSURE TIME

First of all, let's talk about what may be the most important setting: the shutter speed. Back in the day, when I was looking for some useful tips about how many seconds I needed to use to photograph the aurora, on many websites I found the simple answer of "around 25–30 seconds".

Well, later I discovered that the real answer is not so easy; there are many variables that could affect the exposure time.

The most important variable you have to observe is the aurora strength. If you use an exposure time of 25 to 30 seconds on a really powerful aurora, most of the time the brightest points of the highlights will be completely burned out and all you will see on your backscreen will be an undefined green glow. With powerful auroras you need to keep relatively low shutter speeds, in a range that varies from 2 to 8 seconds. You should use longer exposures only when the aurora is subtle and weak, but be careful not to go beyond a 25-seconds shutter speed; otherwise, the stars will start to look like trails. To calculate the maximum exposure time to keep the stars looking like points in the shot (other than making some experiments yourself) there are many rules; however, I think the most accurate one is 300 divided by the focal length you are currently using.

For example:

300 / 14mm = 21.4 seconds

So, if I have mounted a 14 millimetre lens on the camera, the maximum exposure that I should use if I want to have the stars as points and not trails is 21 seconds.

As I said before, you should only use this shutter speed if the solar activity is really low: in that case, the aurora itself does not have a true and proper form, so it would be undefined no matter the exposure.

For example, in the shot above the northern lights were not so strong and I had been able to use a long exposure, not worrying about washing out the aurora but only thinking about making the stars look correct. In contrast, in the shot below, the aurora literally exploded over my head and I had only a few seconds to calculate the right shutter speed not to blur the highlights: in the end I chose a four-second exposure for the shot.

Actually, there is even another factor you will need to consider when you are planning your trip: the moon phase. We will talk about this at the end of the chapter.

Now that you know which shutter speed you must set by relying on the aurora strength, the stars and the lens that you mounted on the camera, let's move on to the next setting: the aperture.

3.2.2 THE APERTURE

The next parameter that you need to check as soon as you turn on your camera is the lens aperture.

It's pretty simple to set up the aperture to shoot during the night: You just need to use the widest aperture allowed by your lens.

For example, let's say that you have a Nikon 14-24mm f/2.8 G ED. The maximum aperture possible on this lens is f/2.8, and you'll need to use exactly that. In contrast, if you have a Sigma 20mm f/1.4 HSM Art, you should open up the aperture until f/1.4, so that the lens is able to capture even more light.

Now here everything seems so easy, but in reality you will have to reach a compromise: At the maximum aperture, all these lenses will have a noticeable loss of sharpness. Some photographers even refuse to use a lens to its widest aperture because of this dramatic loss of quality. My opinion is that if you are planning to make some really big prints of your shots, where everything must be perfect and resizing is not even an option, well, you should find and buy the sharpest lens on the market and even so, still not use it to the maximum aperture. Instead, if you just want to look at the photos on your computer screen or make some little prints of them, you can easily use also the maximum aperture; once you resize it and apply some sharpening in post-production, you will not notice big differences. Anyway, you are free to make some tests yourself and decide which option fits you better.

Getting back to the two examples I made before, with the Nikon 14-24mm f/2.8 you should close the aperture from f/2.8 to f/3.2, where you should already notice big improvements. For the Sigma 20mm f/1.4 HSM Art, the sharpness drastically increases from f/2.0, so keep that in mind if that is the lens that you have chosen.

Now that you know how to handle both the exposure times and the

aperture of the lens, let’s look at the third big setting to regulate: the ISO sensitivity.

3.2.3 THE ISO SENSITIVITY

The ISO sensitivity, in a few words, is a digital way to increase the camera's sensitivity to light and therefore enhance the brightness of the photos. The higher the ISO, the higher the sensitivity.

Between all the settings I've spoken of up until now, this is without a doubt the most problematic one.

Not only can a wrong ISO choice affect your shot by overexposing or underexposing it, but if you use an ISO sensitivity that your camera cannot handle, your photos will be too noisy and they will be ruined.

The reference value where the noise is close to being nonexistent is ISO 100. You will never use this value during a night shooting session; rather, you will need to raise the ISO and let the camera sensor capture more light.

The goal is to maintain the lowest ISO possible and in the meantime, keep the right shutter speed.

Let me explain it better with a simple example: If, in that moment, the aurora is not strong, you should be able to use an exposure of 20–25 seconds, right? Well, this allows you to lower the ISO to around approximately the ISO 800/1000 target, which is pretty good. Most cameras nowadays don't have any problems shooting at that sensitivity, so don't be afraid to set it up.

The problems come when the aurora is powerful and you need shorter exposure times to capture the movement. In this case you will be forced to raise your ISO to around ISO 2500/3200 and sometimes even ISO 6400/12500 to get the right exposure for the photo and not underexpose it.

Don't make the mistake of making the shutter speed choice after you have already chosen the ISO. The priority should always be given to the exposure time and then you can think about ISO.

The trade-offs about the use of high ISO sensitivity are the digital noise that appears in the photo and the consequent loss of quality.

Let me show you what this means:

The image above is a 100 percent crop from a photo taken at ISO 800. As you can see, there is a little bit of grain, but nothing that could ruin the image and you can reduce it even more later with a little bit of post-production.

In contrast, the image above is a 100 percent crop of a shot made at ISO 3200. The difference between the two shots is pretty noticeable: there is a lot more grain in the second image compared to the first one. You will still be able to reduce it in post-production, but the workflow will be more complex and you could create artifacts or lose some details while working on noise reduction.

That is why earlier I suggested you use a full-frame camera. These cameras can better handle the noise on the images and you will have to worry a little less if you use one of those models.

These three settings (shutter speed, aperture and ISO) are by far the most important and the first things you should control when you turn on the camera.

3.2.4 THE WHITE BALANCE

After you are sure that you have set all the previous parameters correctly, you can move on to set the white balance of the shot.

First, you should know that you can perfectly edit the white balance later in post-production with just the movement of a slide, a really easy step. I am saying this because during the night, the white balance on camera often will not be perfectly correct: sometimes you will see a strong red dominance in the shot (especially if there is some artificial lights), and other times you will find a strong blue dominance (especially if the shot is underexposed).

The white balance can be measured with Kelvin temperatures; for the photography that we are going to do, most of the time we will remain in the 2000K/9000K range. You can decide if you want to let the camera set the temperature by itself with its automatic white balance option, or set it manually; if you can, I suggest to you the second one, as it is really takes only a matter of seconds. The general rule that you have to apply when you are about to set the colour temperature on your camera is that the more red lights you have in your shot, the lower you need to set the temperature to obtain the real colours of the scene. For example: if you are shooting near a city, where there are a lot of artificial orange lights and is possibly also a lot of light pollution, during the night all of your shots 99 percent of the time will come out with a horrible shade of red spread all over the photo. To avoid this, you should lower the temperature until you see that the colours are similar to the real ones.

After a lot of experiments, I found that a really good starting point is around 3800K/4000K, where the colour of the sky should already be pretty true. Of course, it’s just an approximate number; sometimes you will need to raise it even to 5000K, and other times you will set it down to 2500K/3000K. It depends on the situation, of course.

Some camera models (generally the entry-level ones) don’t allow you to manually set the custom Kelvin temperature you need; instead, they just give you some default settings from which you can choose, but in my

opinion they are pretty limiting. Anyway, the best ones for night shooting are Tungsten or Fluorescent; they coincide respectively with 3200K and 4000K.

Now that I've explained to you how it works, let me tell you this: As I already hinted at the start of the section, this setting is easily adjustable later with a slide in whatever post-production software, so do not go crazy if you forget to set it in the field and most of all, don't lose much time around this, as you could risk missing an aurora explosion because you were too busy trying to find the right white balance. If you want to find the right colour temperature right on the field, that's fine; I understand that you want to see your shots come out perfect already on camera, but don't strive to adjust something that can be easily set later without any pressure.

3.2.5 FOCUSING TECHNIQUES

Choosing the correct focus when you cannot see an inch from your nose can be one of the biggest challenges you will have to face while you are out shooting at night. To help you, there are some techniques that you can master that can hugely speed up the focusing process.

Let's go in order of difficulty:

1. The first method, and without a doubt also the simplest one, is to set your lens focus ring to infinity. This technique is generally used when you don't have any subject in the immediate foreground and you are shooting objects that are far away, like mountains or even the sky. To be sure that you are focusing to infinity you can zoom in your Live View and search for the brightest star in the frame: when you've found it, you can check if the focus is correct by moving the infinity sign on the lens ring around a little.
2. The second method, generally used when you have some subjects placed around 2–3 meters from the lens, is to light up those subjects with your headlamp and with the Live View of your camera focus right there. Be sure that all the rest is not out of focus; if it is, you should not use this technique but skip to the next one here below.
3. The third method is also called the hyperfocal technique.

   Let me first define the "hyperfocal distance" in photography. Given the focal length, the aperture and the camera that you are using at that moment, you can calculate a distance where everything will be in focus from half that distance to infinity.

   To make it easier for you, let me explain it with a simple example. Let's imagine that I am shooting with a Nikon D800 and a Nikon 14-24mm f/2.8 at 14mm and f/2.8. The hyperfocal distance with these settings is 2.32 meters, so everything will be in focus from 1.16 meters to infinity. Actually, on the Nikon 14-24mm (and also on many other lenses) you will not find marked on the focus ring the "2.32

meters” distance, because the focus distances end at 1.20 meters and then there is infinity. In this case you will be bound to focus on infinity and make some experiments yourself to see where exactly the hyperfocal distance is (and maybe you can put a mark on it so it will be easier to find it the next time).

Nowadays, to calculate which exactly is the hyperfocal distance for your settings, there are a lot of smartphone applications that can help you. I am currently using Photopills, which I believe is one of the most complete on the App Store, but it’s not free. Anyway, if you search for “Depth of Field Calculator” or “Dof Calculator” on any app store, you will find many free applications that will fit your needs.

4. The last and trickiest focusing technique is called the “focus stacking technique”, and to master it you will need some good skills in post-production as well as on the field.

   To keep things as simple as possible, this technique is based on shooting multiple photos on the field with different points of focus and then merging them in post-production.

   Generally, this method is used when you have a really close subject in the foreground (0.30–0.70 meters from the lens) and you are obliged to make multiple shots to have everything in focus.

   The procedure I follow when I have to use focus stacking is this: First of all, I make a shot of the sky (generally at infinity), so to be sure that the aurora shot is already in my memory card and I can concentrate on the foreground. The next step, without changing the focus, is to make a shot with a lower ISO and a longer exposure for the objects that are far away in the foreground, to keep things less noisy. Now, you should illuminate the close objects that you have near the lens with your torch/headlamp and focus them in your Live View. You will notice that everything else (the sky, the far away details) will be blurred, but right now, do not worry about it – it is fine. This last step could require more than one shot, depending on the size and the proximity of the objects you need to shoot.

   When you are at home and you are post-processing these shots,

before starting with all the colour and contrast adjustments you will need to merge all the shots you took, with the correct use of the auto-alignment tool, brushes and layers. I highly suggest you search for some tutorials on YouTube for this part, because it would be incredibly difficult to explain it in words. Just look for “focus stacking” on YouTube and you will find plenty of videos that show you the process.

3.3 POST-PRODUCTION

As you probably know, there are many different thoughts about the post-production of a photo in the photography world nowadays. On one side we have photographers who think that the shot is already finished right in the moment that it comes out of the camera and on the other side. Some photographers think about their shots as “art” and they feel entitled to make many changes in the photo with the help of post-production. Everyone has their own personal point of view on the argument and it is really difficult to convince someone to change their ideas – I will not do this here. If you think that post-production is not necessary in your shots, I respect your point of view.

My personal opinion is that post-production is fundamental to making a good shot even better, as long as it respects the real situation. Careful, I am not talking about photomontages or other things that could distort reality. The right way to post-process a photo (still, in my personal opinion) is to enhance the colours and details, without adding artefacts or things that there were not there at the moment. I cannot explain step by step all the adjustments I made on every photo (because I work differently on every shot), but I will make a list of the ones I use the most to give you an idea of what it takes to give something extra to your images with the help of post-production. To guide you through the process, I will use one of my best aurora shots, made during my last trip to Iceland over the Godafoss waterfall.

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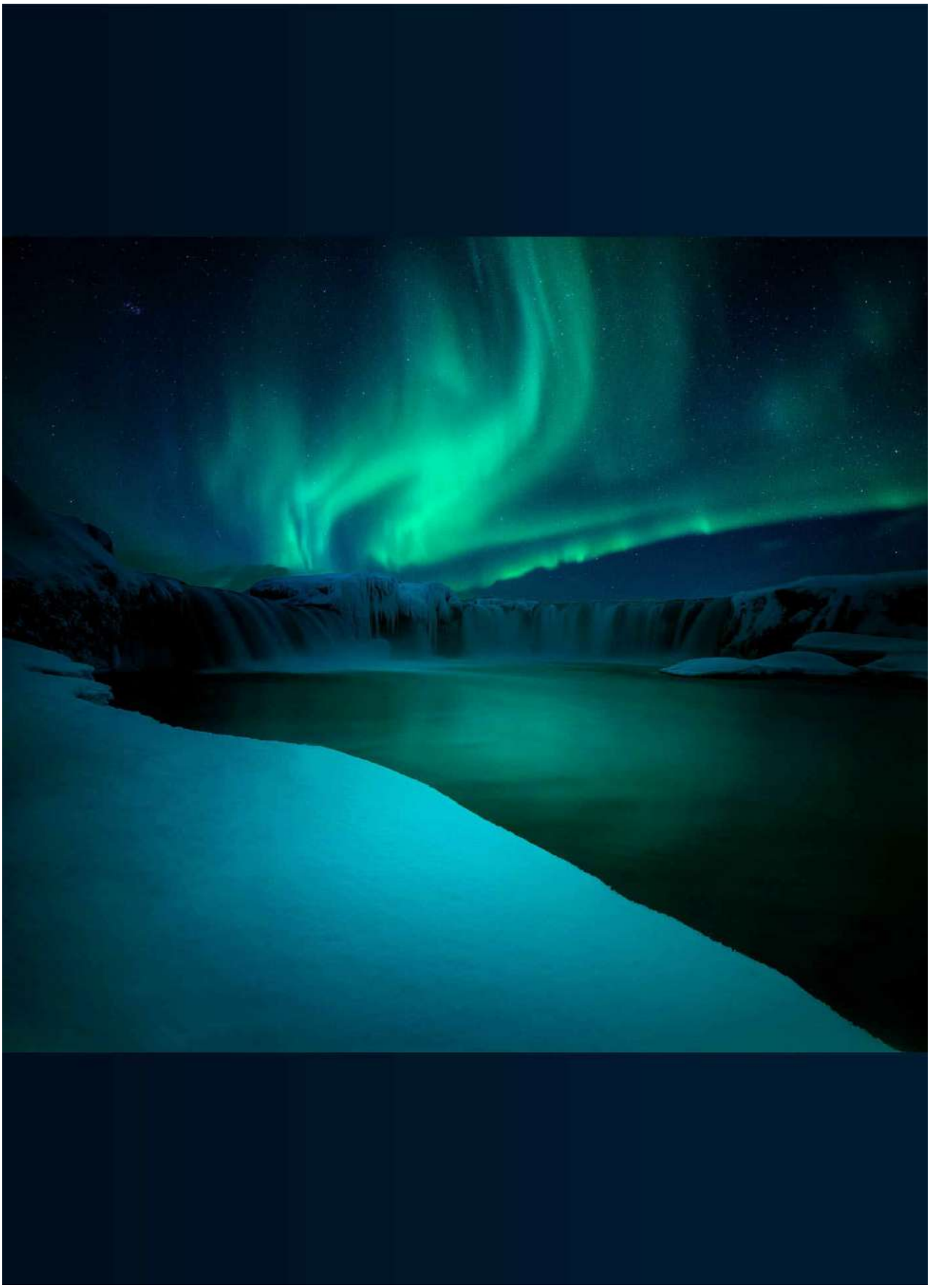
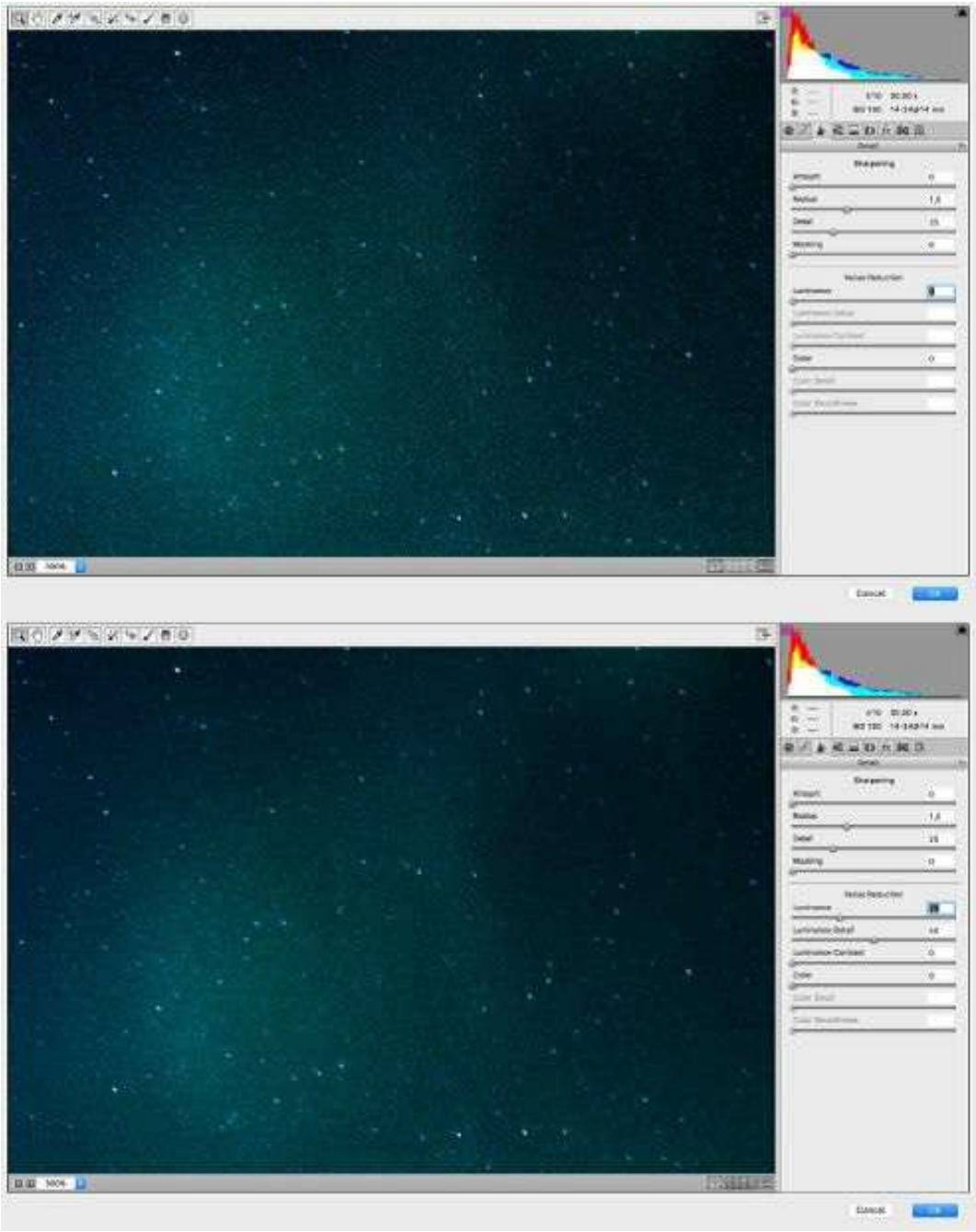


1. Noise Reduction: In every aurora shot I have made, the first thing I do is to reduce the noise as much as possible.

I usually apply the noise reduction through Adobe Camera Raw, setting the Luminance slide to a value between 0 and 30 (the higher the ISOs, the higher the value). In the past, I have also tried some plugins (for example, Topaz DeNoise) but I really did not see any big improvements between those plugins and Camera Raw, so I stick with the second.



2. Curves: For me, curves are without any doubt the most important adjustment I make on every shot. Through the curves you can add contrast, you can work on the colour dominance selectively of the highlights, the shadows and the midtones. Through a precise use of the curves and layers, the image is almost ready for me.

3. Saturation: Together with curves, the saturation is a very powerful adjustment and it needs to be used carefully; otherwise you risk giving your shot a surreal and unpleasant look. While you are deciding how much to saturate the colours, always think about how the real situation was when you were out shooting and stick with it; that is my suggestion. Generally, I never exceed +15 on the saturation slide.

4. Colour Balance: If you did not manage to find the right colour balance with the curves tool, you can use this great and specific tool to do so. With the use of this adjustment, you will be able to give to your photo the colour dominance that you want, by just experimenting a little with the sliders.

To post-process my photos I have always used Adobe Photoshop, but the tools I have listed above can be found in every post-processing software, so do not worry if you do not have Adobe Photoshop.

3.3.1 THE DOUBLE EXPOSURE

Last but not least, in this paragraph I want to teach you a relatively simple trick that you can use to make your shots less noisy, at least regarding the foreground. This technique is called the “double exposure”.

The first thing you should do is right on the field at the moment of the shot: after you caught the aurora show and you have made all your sky shots, it is time to make a clean shot for the foreground with lower ISO and longer exposure times.

Do you remember the 20–25 second limit you have when you are shooting the stars, before they start to look like trails? Well, you do not have to consider it here, because you are making a shot only for the foreground. For this shot, you should lower the ISO down to 200 or 400 and use an exposure time even of some minutes. With this method, you can recover a lot of the details lost due to the high ISO and the short exposure time, so that the shot will be a lot more readable and pleasing to the eye.

The next step is to merge the foreground shot with the sky shot in post-production. You should use masks and layers. It is a work that requires a minimum of accuracy but it is not difficult at all; you will only have to practice a little.

3.4 THE MOON

Many photographers fail to consider the moon factor while planning their winter trip to the north, not understanding how it will impact on almost every single aspect of a holiday. This is one of the biggest mistakes you can make, because you could potentially return home without the shots that you had in mind precisely because of the moon.

First of all, you need to know what kind of photos you want to make. The same landscape could be totally different with and without the moonlight.

There are pros and cons of photographing both with new moon or full moon. Its light can help you to make shorter exposures for the foreground and maybe even to choose the best subject to shoot around you (because you can see it!). The downside is that you will not see a lot of stars and the aurora itself should be more powerful to sparkle over the strong light of the moon.

On the other side, shooting without the help of moonlight can be really challenging. It's hard to see what surrounds you to find good subjects to photograph, especially if you don't know the location and the shots will be more noisy. But in return, if solar activity is strong, the aurora will shine better in the sky and you could witness a light show that simply would not be the same with the moonlight.

The photo below is an example of what it means to shoot with the help of the moon:

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The settings were ISO 640, f/2.8 and 13 seconds, single exposure. As you can see, the icebergs are well illuminated but there are not so many visible stars in the sky.

In contrast, the photo below shows you what awaits you if you choose to make your trip during the new moon phase:

This is a single exposure made at ISO 2500, f/2.8, 4 seconds. The aurora here was really powerful and I had to keep a fast shutter speed to capture the movement. As you can see, there are a lot more stars than in the shot before and the aurora stands out better in the sky.

You probably already understand the setting changes you will need to make if you are shooting with the moonlight, but just in case, I will summarize here for you. The moon will allow you to reduce the exposure time and/or lower the ISO, depending on which kind of situation you are in.

I personally prefer the new moon phase, even if most of the time the shots will be noisier and you cannot see a inch from your nose. It's the best time of the month to catch some strong aurora shows, of course, if solar activity is powerful. Anyway, every photographer has his or her own opinion on the argument, so it's a matter of taste I think.

Here is another example of an aurora shot with the direct moonlight, made at ISO 800, 15 seconds and f/2.8:

So, have you already decided if you are more a new moon or full moon kind of person?

The final choice is up to you!

CONCLUSION

Well, the time has come: We have arrived at the end of this book.

I want to give you my farewell with this photo taken at the famous Mt. Kirkjufell in Iceland, which is among my all-time favourite aurora shots I've taken.

I hope that with this book you learned something useful – something that will actually be helpful before, during and after your trip. I think I have included all the most important steps, from planning your visit to the northern regions of our planet to how you need to operate when you are out in the field hunting light shows, and finally, how to post-process the photos you have made during your holiday.

My biggest wish is that all of you will manage to actually make a trip to witness the aurora borealis, because it's one of the most incredible, beautiful and amazing natural phenomena of our earth and everybody deserves, at least once in his life, to observe the green lady dancing in the sky.

Whether you think this book has helped you in some way or you felt it was completely useless, I would love to hear your thoughts. For me, it is very important and I would be really grateful if you could give me feedback through a review on Amazon. It's only a matter of two minutes of your time, but the help that you would give me is huge.

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If you have any more doubts or you want to discuss some specific argument, feel free to contact me at:

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If I can, I will be glad to help you.

If you liked the shots that you saw all throughout the book, you can follow me on the social networks!

Instagram:

https://www.instagram.com/leonardo.papera

Facebook:

https://www.facebook.com/leonardo.papera

Thank you all for your attention
and I wish you good aurora hunting.
Be safe out there!